

Appln. No. 09/385,822

Amdt dated April 24, 2003

Reply to Office action of December 31, 2002

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A method of eliminating unwanted steps at edges in image representations in the line raster, in particular in on-line operation, characterized by the steps:

a) application of an edge operator to [an] a rastered image portion for coarsely ascertaining at least one rastered edge configuration in the rastered image portion,

b) determining the position of at least a first pixel from the amount of those pixels which form the rastered edge configuration or adjoin said rastered edge configuration,

c) approximation of a straight line for ascertaining a probable configuration of the unrastered image edge in the proximity of the first pixel,

C) d) ascertaining a criterion from the approximation straight line and the position of the first pixel for mixing a color X to the color C in the first pixel considered, and

e) mixing the ascertained color X to the color C in the first pixel considered.

2. (Original) A method as set forth in claim 1 characterized in that the criterion of method step d), in dependence on the position of the pixel being considered relative to the approximation straight line, establishes which color X is mixed to the color C of the pixel being considered.

3. (Original) A method as set forth in claim 2 characterized in that the criterion in accordance with method step d),

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in dependence on the position of the pixel being considered relative to the approximation straight line, establishes that the color of at least one adjacent pixel is mixed in weighted mode to the color of the pixel being considered.

4. (Previously Amended) A method as set forth in claim 1 characterized in that in the case of a pixel being considered which is not intersected by the approximation straight line, the color remains unchanged.

5. (Previously Amended) A method as set forth in claim 1 characterized in that in the case of a pixel being considered which is intersected by the approximation straight line the resultant color R is determined in accordance with the following criterion:

C₁ the approximation straight line divides the pixel being considered into two surface portions F₁, F₂, wherein $F_1 + F_2 = 1$, with 1 being the total area of the pixel, wherein F₁ is that surface portion in which the pixel center point lies:

- mixed to color C of the pixel being considered is the color X of that adjacent pixel which adjoins the longest edge, formed by the raster, of the surface portion F₂.

6. (Original) A method as set forth in claim 5 characterized in that the resultant color R arises out of the original color C of the pixel being considered and the mixed color X of an adjacent pixel in accordance with the following equation:

$$R = F_1 \times C + F_2 \times X$$

7. (Previously Amended) A method as set forth in claim 5 characterized in that the surface portions F₁, F₂ are approximated by a suitable approximation process.

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8. (Previously Amended) A method as set forth in claim 1 characterized in that said method steps are applied to an image portion treated by means of rendering and/or a shading process.

9. (Original) A method as set forth in claim 8 characterized in that the shading/rendering is triangle- or scanline-based, or that it involves Gouraud or Phong shading.

10. (Original) A method as set forth in one of the preceding claims characterized in that the above-specified method steps a) through e) are carried out individually or in groups in time-displaced relationship.

C 11. (Original) A method as set forth in claim 10 characterized in that the time displacement is at least one image line.

12. (Previously Amended) A method as set forth claim 1 characterized in that the processing is effected in time-displaced relationship in a frame buffer without further intermediate storage.

13. (Currently Amended) [~~A method as set forth in claim 1 characterized in that~~] A method of eliminating unwanted steps at edges in image representations in the line raster, in particular in on-line operation, characterized by the steps:

a) application of an edge operator to an image portion for coarsely ascertaining at least one rastered edge configuration,

b) determining the position of at least a first pixel from the amount of those pixels which form the rastered edge configuration or adjoin said rastered edge configuration,

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c) approximation of a straight line for ascertaining a probable configuration of the unrastered image edge in the proximity of the first pixel.

d) ascertaining a criterion from the approximation straight line and the position of the first pixel for mixing a color X to the color C in the first pixel considered, and

e) mixing the ascertained color X to the color C in the first pixel considered.

wherein the approximation straight line passes over a plurality of steps of the rastered edge configuration and that the approximation straight line ends when the criteria

- 1) there can occur a maximum of two different step lengths, the step lengths of which may also differ by a maximum of 1,
- 2) only one of the two step lengths may occur a plurality of times in succession,
- 3) the sequential arrangement of the numbers of the steps which are of the same length gives a number sequence in which there is alternately always a one and then any number (>0). The ones (only those at each second position) are deleted from that sequence. In the sequence obtained only two different numbers which differ by one may again occur,
- 4) in the sequence obtained in 3, only one of the two possible numbers may occur a plurality of times in succession,
- 5) by repeatedly applying rules 3, and 4, to the number sequence, it is possible to obtain an ever more global view onto the edge,

are checked in rising succession and at least one criterion is not fulfilled.

14. (Currently Amended) [~~A method as set forth in claim 1 characterized in that~~] A method of eliminating unwanted steps at edges in image representations in the line raster, in particular in on-line operation, characterized by the steps:

a) application of an edge operator to an image portion for coarsely ascertaining at least one rastered edge configuration,

b) determining the position of at least a first pixel from the amount of those pixels which form the rastered edge configuration or adjoin said rastered edge configuration,

c) approximation of a straight line for ascertaining a probable configuration of the unrastered image edge in the proximity of the first pixel,

d) ascertaining a criterion from the approximation straight line and the position of the first pixel for mixing a color X to the color C in the first pixel considered, and

e) mixing the ascertained color X to the color C in the first pixel considered,

wherein the approximation straight line passes over a plurality of steps of the rastered edge configuration and that the approximation straight line ends when one of the criteria

- 1) there can occur a maximum of two different step lengths, the step lengths of which may also differ by a maximum of 1,
- 2) only one of the two step lengths may occur a plurality of times in succession,
- 3) the sequential arrangement of the numbers of the steps which are of the same length gives a number sequence in which there is alternately always a one and then any number (>0). The ones (only those at each second position) are deleted from that sequence. In the sequence obtained

only two different numbers which differ by one may again occur,

4) in the sequence obtained in 3, only one of the two possible numbers may occur a plurality of times in succession, or one of the criteria 1), 2), 3) or one of the criteria 1), 2) is not fulfilled.

15. (Currently Amended) [~~A method as set forth in claim 1 characterized by the provision of]~~ A method of eliminating unwanted steps at edges in image representations in the line raster, in particular in on-line operation, characterized by the steps:

a) application of an edge operator to an image portion for coarsely ascertaining at least one rastered edge configuration,

b) determining the position of at least a first pixel from the amount of those pixels which form the rastered edge configuration or adjoin said rastered edge configuration,

c) approximation of a straight line for ascertaining a probable configuration of the unrastered image edge in the proximity of the first pixel,

d) ascertaining a criterion from the approximation straight line and the position of the first pixel for mixing a color X to the color C in the first pixel considered,

e) mixing the ascertained color X to the color C in the first pixel considered, and

f) providing a triple buffer, wherein the three resulting buffers share in cyclic interchange in parallel relationship the method steps of rendering post-anti-aliasing and image reproduction.

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16. (Cancelled)

C, 17. (Cancelled)

18. (Cancelled)
